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The Influences Virtual Physics Laboratory (VPL) For Assessment the Millennial Character Education through System Recording Students Character (SRSC)

Firmanul Catur Wibowo[1], Soffan Nurhaji[2], Agus Setiawan[3], Wisnu Ardlian Sugiyarto[4], M. Noor Faizin[5], Dina Rahmi Darman[6], Achmad Samsudin[7], Andi Suhandi[8], Bayram Coştu[9]

[1, 2, 6] Department of Physics Education, Universitas Sultan Ageng Tirtayasa, Indonesia
[3] Department of Mechanical Engineering Education, Universitas Pendidikan Indonesia, Indonesia
[4, 5] Senior High School 1 Wonotunggal, Batang City, Indonesia
[6] Junior High School 2 Kudus, Kudus City, Indonesia
[7, 8] Department of Physics Education, Universitas Pendidikan Indonesia, Indonesia
[9] Department of Science Education, Faculty of Education, Yildiz Technical University, Istanbul, Turkey

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ABSTRACT

Virtual Laboratory are frequently measured effective learning tools, meanwhile their visual and concept power empower students to better known physical structures and phenomena. However, in previous research has not been much developed Virtual Physics Laboratory that is used to measure the character education of students. This research aims to Influences and apply Virtual Physics Laboratory (VPL) for assessment millennial character education with System Recording Students Character (SRSC). The study focused on the VPL Conceptual Change of Character Education test results. The sample consisted of 60 students' whose age ranging from 20 to 21 years old with research design Randomized post-test only experiment group. Data to draw conclusions of research results, collected through the provision of concept tests. Conceptual Change data of Character Education that will be obtained from both groups are searched for the average Gain. Specific targets to be achieved in this research are innovations in the development of assessment tools that are valid and easy to use and can be done with Virtual Physics Laboratory for assessment millennial character education with System Recording Students Character can be done anytime and not limited by time. The result of the research showed that the N-gain mastery of the experimental group concept was 0,33 (32,6%) The conclusions of VPL with SRSC research can be used in the evaluation of physics learning because of the quality of the material according to expert judgment in the category of "excellent" and effective in facilitating assessment to character education of students.

Corresponding Author:

Firmanul Catur Wibowo,
Department of Physics Education,
Universitas Sultan Ageng Tirtayasa,
Jalan Raya Ciwaru No. 25, Serang City, 42124, Indonesia.
Email: firmanulcaturwibowo@untirta.ac.id

1. INTRODUCTION

Natural Science is a subject that is concerned with how to find out about nature systematically, so that science is not only the mastery of a collection of knowledge in the form of facts, concepts or principles but also a process of knowledge discovery [1]. Conceptual change is one of the most studied international

studies and has been a major issue in science education since the last three decades. In accordance with the literature review, conceptual change theory adopts Posner in [2] about the principle of dissatisfaction of students with the existed concept, plausibility of new concept, intelligibility, of new concept, and fruitfulness (success) of new concept [3]. These four principles deeply influence the theories of further conceptual change. Many studies suggest that there is a relationship between students' alternative conceptions and reasoning abilities [4]. Alternative conception is a conception of students who are not yet complete and can change (undergoing conceptual changes) towards the scientific concept of conception. The linkage between scientific reasoning and conceptual change is very close. Students' deductive reasoning is not always active and is used in the conceptual change process [5-7].

The main indicators used to assess the quality of learning and the graduation of students from an educational institution, often based on student learning outcomes are listed on the test results of learning outcomes. So it becomes very necessary to know how the quality and character of the assessment tools are given to the students, given that assessment is an integral part of the learning process. The purpose of assessment in an ordinary learning process conducted assessment through the implementation of the test. Traditionally the test items are packaged in paper and pencil test. This is reinforced [8] in his article stating that in carrying out assessment of learning outcomes on campus there is a tendency of teachers to prioritize the use of tests (paper and pencil test) as the single most important measuring tool in the educational process. In the implementation, not infrequently the students are wrong in answering the problem due to lack of understanding the purpose of the problem, or misinterpretation of the matter. Of course this is not expected to happen because it is very harmful and not in accordance with the implementation of the test itself. The development of information and communication technology (ICT) based on computer technology offers another alternative to an assessment format. One of the advantages of computer technology is the ability to animate an object to produce a motion image [9]. With this capability allows static images in paper and pencil test format can be converted into dynamic images in animated matter format. There are indications that for issues related to dynamic phenomena such as the motion phenomenon of an object, the test items will be very advantageous if they are packaged in a motion animation as will be designed in Virtual Physics Laboratory (VPL). There is strong evidence to show that in order to understand the phenomena associated with the heat transfer of an object, students need relevant virtual microscopic simulation [10] [7]. Even a study of the use of items in the form of simulation in dry cell microscopic simulation to evaluate the understanding of physics concepts successfully performed and published (e.g. [11] [10]. Results of his study showed that with items that are packed in the form of animation, the concept of understanding the concept of light can increased from before.

Laboratory is an effective mode of learning to improve students' understanding [12] and scientific process skills [13]. Four reasons for the importance of laboratory activities [14], namely: (1) The laboratory can generate the motivation to learn science; (2) The laboratory may develop the basic skills of experimenting; (3) The laboratory as a vehicle for learning to apply a scientific approach [15]; (4) The laboratory can support the mastery of learning materials. The main goal of the physics laboratory is to increase the knowledge of physics; develop practical skills; arousing interest, developing creative thinking and problem-solving abilities; improve scientific thinking skills and provide practice in experimental methods [16]. Laboratory activities also offer a context-rich learning experience, enhance conceptual understanding, develop practical skills and are the best way to reflect the nature of science [17].

Millennial Character Education is very important for students considering some considerations: (1) The effectiveness of higher education is being assessed in terms of the extent to which students acquire the skills they need to work in The Future of Empathy: Teaching the Millennial Generation [18]; (2) Universities around the world are expected to produce graduates with skills in investigation capable of responding to the constantly changing and complex needs at work [19]; (3) The selectors of the work world expect higher education institutions to install inquiry skills into the curriculum [20].

System Character Education is an effective mode of learning to improve students' understanding [12], and scientific process skills [21] [14]. Suggest that there are at least four reasons for the importance of SCE activities, namely: (1) SCE may generate learning motivation in science; (2) SCE may develop basic experimental skills; (3) SCE as a vehicle for learning to apply a scientific approach; 4) SCE can support the mastery of learning materials. SCE's activities also offer a context-rich learning experience, enhancing conceptual understanding, developing practical skills.

However, the implementation of physics lessons that occurred in the field is still very far from what is expected by the Curriculum 2016 that has been issued by the government. A preliminary study conducted [22-23] in one of the academic campus in Serang City shows that: first, physics learning conducted in academic campus is generally traditional, where learning tends to be teacher-centred, with the process tending to be knowledge transfer; secondly, the average achievement of the students' physics learning outcomes on the evaluated aspects is low, even at the cognitive level. Such circumstances have

made students seem bored and saturated with physics learning and ultimately their interest and motivation to learn physics tend to decline; third, the learning process conducted in the classroom is more often dominated by lecturers, and less facilitate character students.

Referring to the above findings, it is important to develop the Virtual Physics Laboratory (VPL) for Assessment of the Millennial Character Education through the System Recording Students Character (SRSC).

2. RESEARCH METHOD

The research location is in one of campus in Serang city, Banten, Indonesia of academic year 2015/2016. The time of the research is planned 8 months from the proposal submission to the reporting. The observed variables are: (1) conceptual change of the student; (2) the effect of applying Virtual Physics Laboratory (VPL). This research uses Quasi Experiment method with research design using The Randomized Post-test-Only Control Group Design [24]. The design is shown in Figure 1.

Group	Random	Pre-test	Treatment	Post-test
Experiment	R	X	O	X

Figure 1. Research Design the Randomized Post-test Only Control Group Design

Information:
R: Selection of class at random
O: Treatment physics learning in with Virtual Physics Laboratory (VPL) items in the experiment group
X: The experiment group

Research Design in this research are the students of sample consisted of 60 students' whose age ranging from 20 to 21 years old. With a random sample technique one classes were taken from experiment groups. In addition to the dilator by the ability to understand the concept of students who are still low as has been explained in the background. The steps taken in this research include 5 steps, namely: field study, literature study, instrument design, instrument trial, implementation, and ending with analysis of results and drawing the full conclusion can be seen in the flow of research figure 2

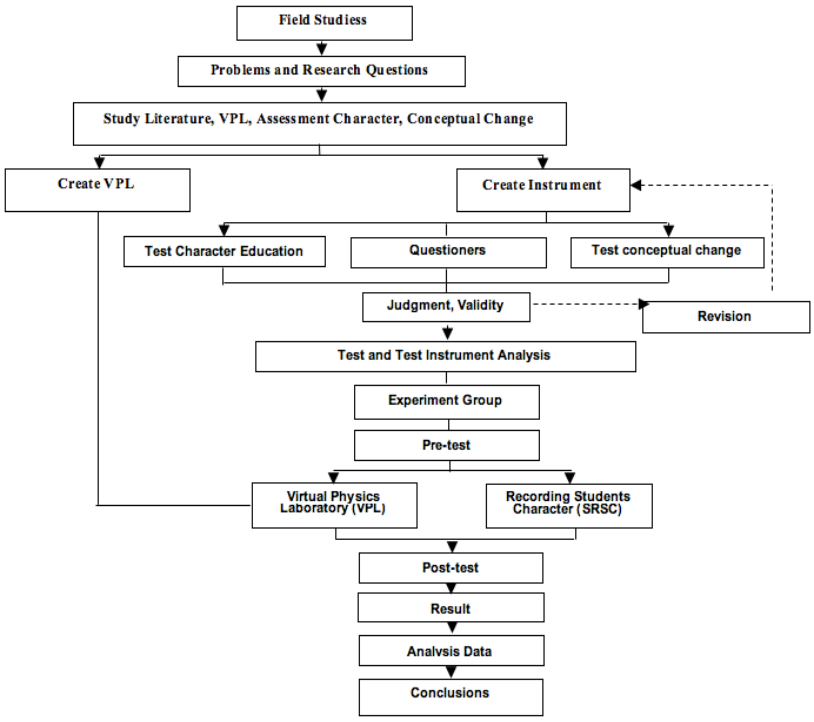

Figure 2. Design Research

Field study is intended to know the development of light material learning in one academic campus in Serang City which is related to the average value of daily physics re-examination of the students. This field study was conducted by non-formal interview with a Physics Teacher concerned on learning Light matter with character education after lesson. The result found that students' concept comprehension is still quite low which is indicated by the average value of daily physics student's re-examination. In addition to that, it is known that the campus has adequate computer facilities but these facilities are not utilized in physics learning. Furthermore, the findings can be used as a foothold that future Virtual Physics Laboratory (VPL) through System Recording Students Character (SRSC) to measured millennial character education can be received with positive response from students and teachers concerned.

3. RESULTS AND ANALYSIS

3.1. Results of the developing Virtual Physics Laboratory (VPL)

From the overall validation done by the material experts and media experts the result is a very good average with some improvements that must be made to perfect the Virtual Physics Laboratory (VPL). While visually can be seen from the view of the main menu page is the material menu. Some results of the changes on these pages can be seen from Figure 3 and Figure 4.

Figure 3. Main Page of the VPL Menu

Beside Figure 3. There is a change in the hierarchy of the material menu before improving only the light menu, reflection and refraction, based on input from the expert changes occurred with the addition of the menu.

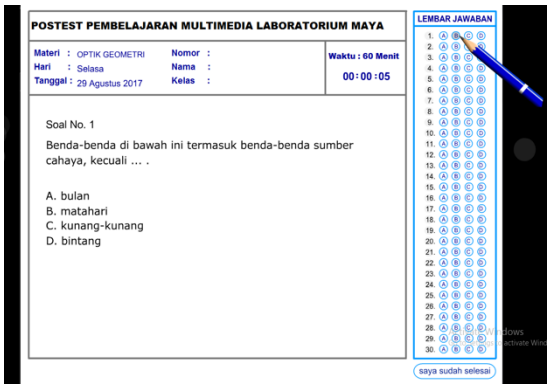

Figure 4. Page Evaluation Menu

From Figure 4. It shows that there is an introduction submenu added and a previous evaluation that you did not yet have. These additions are based on expert material input

3.2. Results of the One to One Evaluation Trial

This trial data includes the average of the results of the assessment/responses of students to the products obtained from the questionnaire of student responses and effectiveness tests that show mastery of students' concepts of optical geometry. The average of students' assessment/responses to VPL optical geometry in One to One Evaluation from 3 students can be seen in Table 1.

Table 1. Average Results of Student Assessment/Response to VPL Optical Geometry on One to One Evaluation (Trial One to One Evaluation)

No	Assessment/ Response to VPL	Average	Criteria
1	The VPL used helps me understand difficult and abstract concepts	2.7	Enough
2	Inside this VPL there is a tutorial / exercise problem to train the concepts I learned in the material view	2.3	Poorly
3	In this VPL there is a repetition problem to evaluate my concept mastery	3.7	Good
4	The existence of scoring in repetition can show how far I master the concept of the given material	3.3	Enough
5	I prefer to study physics if the learning using VPL	2.3	Poorly
6	If this VPL is used for other material / subject matter, I will be happy to use it	3.0	Enough Good
7	I'm Not bored, while using VPL	3.0	Enough
8	After I use this VPL, I feel motivated to study hard	2.3	Poorly
9	This VPL can help me solve the false I've encountered	2.0	Poorly
10	I can use VPL easily because it's easy to understand the instructions	1.7	Poorly
11	The use of Indonesia language in this VPL can help me in understanding the material presented	3.0	Enough
12	This VP has simulations that can help me to better understand the concepts provided and clarify my conceptual understanding	3.7	Good
13	With the image, I can remember the information learned	3.3	Enough Good
14	Animations (moving pictures) and simulations helped me in seeing the rare event process I encountered	3.3	Enough Good
15	I easily remember the navigation system that is in VPL	2.0	Poorly
16	I can move to another page without having to open the next page	2.7	Enough Good
17	I can browse the VPL without having to finish on False one menu, for example from the material can be directly to the exercise question and vice versa	2.7	Enough Good
18	When using VPL, I can get out of each frame as I see fit	1.3	Very poorly
19	In my opinion, this VPL is designed interactively, i.e. I am free to use this inquiry learning model as desired	2.0	Poorly
20	In running this VPL , I rarely encounter False and so the VPL stops	2.0	Poorly
	Average score of student response scores	2,62	

While the average test result of the concept of optical geometry in one-to-one (One to One Evaluation) test from 3 students is the pre-test value mean: 3,33 and the mean of post-test value: 8, N-gain value: 0,28 (28,01 %). Based on VPL testing on one-on-one trials there are notes and suggestions provided by students used for revision.

3.3. Assessment Results on Small Group Evaluation

These test data include the average of the results of the students 'assessment / responses to product tests obtained from student response questionnaires and effectiveness tests showing students' mastery of conceptions of geometric optics. The average result of the students' assessment of VPL optical geometry in Small Group Evaluation from 12 students can be seen in Table 2 and Table 3.

Table 2. Average Results of Student Assessment/Response to VPL Optical Geometry in Small Group Evaluation

Source of Notes / Suggestions	Type of Notes / Suggestions
Trial learning media by students	1. The video is less clear because of the foreign language
	2. Questions on the menu Did you know to be reproduced
	3. No narration of Indonesian language videos

Table 3. Repair of VPL from Small Group Evaluation

Source of Notes / Suggestions	Type of Notes / Suggestions
Trial of virtual lab by student	1. Make translation for video available in MMI VPL
	2. Add a question in the menu did you know?

3.4. Assessment Results on Field Trial (field evaluation)

In the field trials conducted using the sample in the form of experimental groups and control groups. The results of the assessment data on field trials include students' responses to product development and the

effectiveness test of conception master test results after the learning activities. The field test result data (field evaluation) is presented as follows.

Average score data and final test of mastery of geometry optical concept of experimental group and control group. In Figure 5. It can be seen that the average score of the students' pre-test test of the experimental group is 3.30 (11% of the ideal score of 30). The mean score the post-test of the experimental group was 11.97 (39.9% of the ideal score 30), and the average score of N-gain mastery of group concept experiment was 0.33 (32.6%). The average of N-gain of the experimental group and the control group is in the medium category

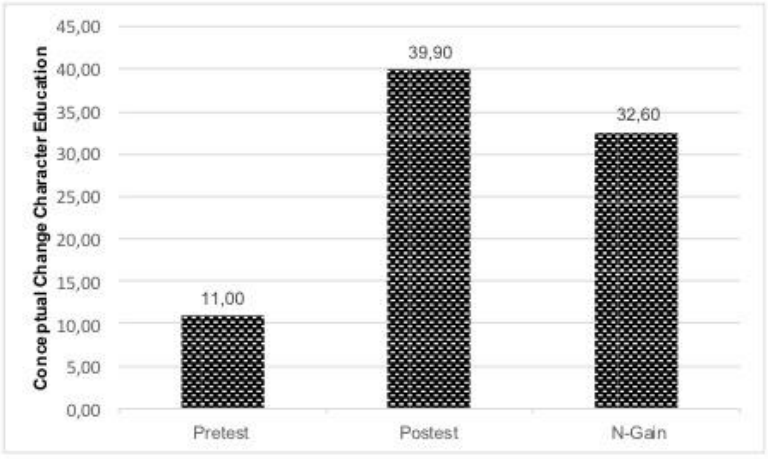

Figure 5. Comparison of Average pre-test, post-test and N-gain Concepts for experiment Groups

To determine whether there were differences in the results of initial test scores, final tests, and N-gain between the experimental group and the control group starting with the data distribution normality test, the homogeneity test of variance, and then the t-test (one tail).

3.4. Specification System Recording Students Character (SRSC)

SRCS software is a web-based software that is a software that requires a web server to run and can be accessed by users using computers, tablets, and smart phones. At the time of software development using XAMPP as web server build date 12 April 2009 21:27:24. SRCS is written using PHP programming language utilizing Yii Framework and java script programming language using Jquery framework. At the time of software development using Yii Framework version 1.1.10 February 12, 2017. The data storage software used is MYSQL version 5.1.33. Table 5 is the software technical specification of SRCS. Specification is the technical criterion of SRCS software.

Table 5. Software Specification

No	Criteria	Specification
1	Type of software	web-based
2	programming language	PHP, javascript
3	Database	MYSQL

Users will interact with the system through the Graphical User Interface (GUI) interface, the following is the SRCS interface display. The login page serves to verify the SRCS software user, only verified software users are allowed to use user-level functionality available on the SRCS software. On the login page the user is asked to enter the username and password in the fields that have been provided. Users will be taken on the next page if successful through the verification process. If there is an error then system will give error message to the user. Figure 6 is the view of the login page in the SRCS software.

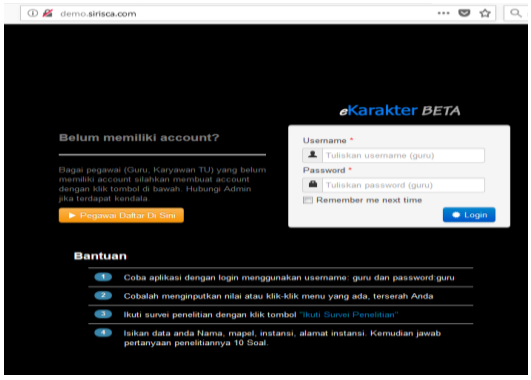

Figure 6. Login page
Accessible via URL: http://demo.sirisca.com

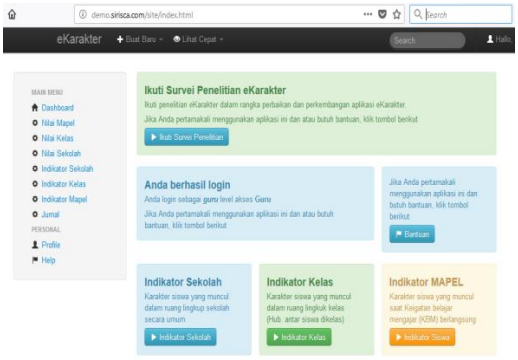

Figure 7. User Home page

The User Level Guru home page or a lecturer, once the user has successfully verified by the system then the user will be taken to a single page called the dashboard. The functionality provided on the home page corresponds to the user level. Figure 7 shows the home page for the user level. These pages are available for user-level functions.

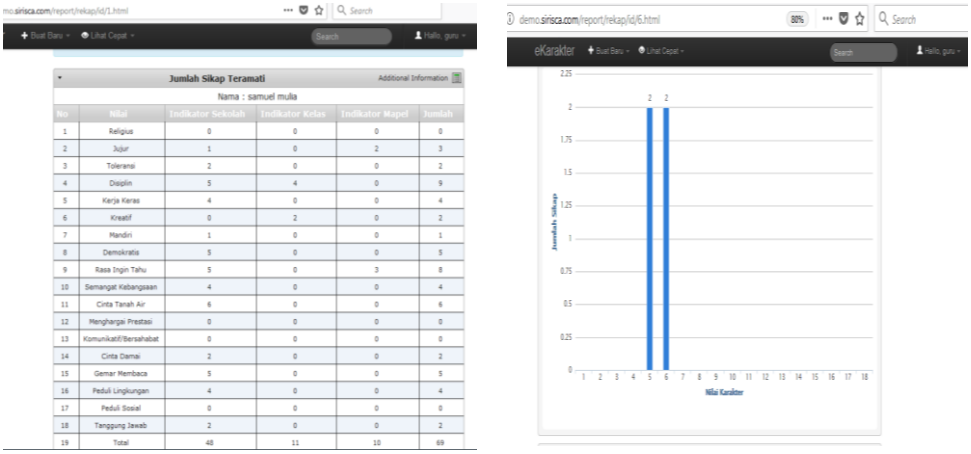

Figure 8. Statistics of Student Attitude

Statistics Page Attitude Observed, the results of the student attitude assessment are recorded in full on the journal page. Any student attitudes observed by teachers or lecturers and input into SRCS software are recorded in three data forms, i.e. tables, bar charts, and pie charts. The table provides complete information on the number of indicators already recorded, the total indicator at each value to the total number of attitudes already observed by the teacher or lecturer. The block diagram provides information on the progression of the grade value of each student, while the pie chart shows the total number of each indicator recorded on each type of indicator. Figure 8 shows the students' attitude charts observed by teachers or lecturers grouped by value and indicator

4. CONCLUSION AND RECOMMENDATIONS

Based on the results of processing and analysis of research data can be drawn some conclusions, The conclusions of VPL with SRSC research can be used in the evaluation of physics learning because of the quality of the material according to expert judgment in the category of "excellent" and effective in facilitating assessment to character education of students. Based on the results of research and discussion that has been done, researchers suggest things as follows: (1) Need to be socialized the use of virtual laboratory so that later VPL programs are more developed in accordance with the needs. (2) Further research is needed to develop and add material that may be made to simulate and complement the multimedia of virtual laboratories.

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